

## ABSTRACT OF THE DISCLOSURE

A phase conjugate mirror comprising a photonic band gap light guide and a stimulated Brillouin scattering medium disposed in operational relation thereto. In  
5 specific embodiments, the light guide is an optical fiber with a high index cladding transparent at a propagation wavelength and a hollow or solid core. The cladding is microstructured silica and supports guide modes through frustrated tunneling photonic band gap guidance or Bragg photonic band gap guidance. The fiber has an array of channels disposed around the core. In one embodiment, the fiber is disposed within a  
10 stimulated Brillouin scattering cell. In this embodiment, the medium is gas, gel, or liquid. In an alternative embodiment, the medium is a solid disposed at the core of the fiber. The invention provides a means of guiding light with a gas filled or solid core structure with high guiding efficiency, high reflection back into the medium, without disturbing the polarization state of the light as it propagates.

15